Technical Memorandum

To:	Dennis McLerran, Regional Administrator; U.S. Environmental Protection Agency, Region 10
Cc:	Randy Hagenstein, Alaska State Director; The Nature Conservancy
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Date:	6/28/2011
Subject:	Technical Memorandum for Pebble Water Quality Database, Version 1

The Pebble Water Quality Database, Version 1, provides a compilation of water quality and sediment quality data from field sampling conducted in the vicinity of the Pebble prospect, Alaska. Field sampling was conducted by the Pebble Limited Partnership (PLP) and The Nature Conservancy (TNC) from April 2004 through June 2010. The PLP data were collected during 2004 – 2007 and obtained from published PDF files on the PLP website: http://www.pebblepartnership.com/environment/data-releases (PLP, 2011). The TNC data are from samples collected by Kendra Zamzow, PhD, of the Center for Science in Public Participation, during May and June 2009 and June 2010.

We have provided the database in two formats: Microsoft Excel and Microsoft Access. Workbooks in the Excel file "PebbleWaterQualityDatabase_Stratus_v01.xls" contain the same basic data as tables in the relational (Access) database "PebbleWaterQualityDatabase_Stratus_v01.mdb." The Access (.mdb) database contains additional details not included in the Excel (.xls) tables, notably auxiliary data concerning laboratory methods and field and laboratory blanks. The Access database also contains the table "tblFlatfile," which provides linked sample locations and measurements, and replicates the data in the Excel file.

A data dictionary for the database is included in Table 1.

Data Restrictions

PLP's water quality data were available on the PLP website in PDF format. These data were identified as "preliminary," with "Do not cite or quote" printed on every page of the PDF file that included sampling results. TNC converted these preliminary data into a format suitable for analysis for the purpose of internal evaluation, and included this preliminary database with other data collected by TNC for potential internal use by others. TNC makes no expressed or implied warranty as to the quality of these data or their applicability for any particular purpose, and has honored the "do not cite or quote" restrictions placed on these data by PLP. Potential users should contact PLP to acquire authorization and/or a finalized database for any publication.

Data Conversion and Quality Control

No laboratory or original data sheets were provided. The PDF files were copied using an optical character recognition (OCR) software and imported to Excel worksheets. PLP used bold numbers to indicate that the parameter was undetected by the analytical method. In this case, the value shown in the PDF file was one-half the method detection limit (MDL) or the practical quantitation limit (PQL). PLP used green-highlighted numbers to indicate that the result was estimated. In this case, the result shown was the PQL.

Table 1. Data dictionary for Pebble Water Quality Database, Version 1

Data field name	Contents
component	Analyte name, definitive
dataset	Indicator of data source prior to this assembly
description	Description of sample location
easting_sp83	Sample location easting coordinate (state plane 83)
fieldrep	Number of samples collected of the same media at the same date and location and same approximate time
geotype	Distinguishes seep, surface water, groundwater locations
lat_dd	Sample location latitude coordinate (decimal degrees)
locationid	Sample location identifier
long_dd	Sample location longitude coordinate (decimal degrees)
mainstem_trib	Description of sample location as mainstem or tributary of river
matrix	Distinguishes water or sediment samples
northing_sp83	Sample location northing coordinate (state plane 83)
qualifier	Measurement qualifiers provided by laboratory
result_ndhalfdl	Reported measurement or, if qualified as non-detected, 1/2 measuring limit
result_ndzero	Reported measurement or, if qualified as non-detected, zero
river_system	Description of sample location water body
sample.type	Distinguishes field samples (including field duplicates) from laboratory samples, such as matrix spikes, laboratory duplicates, etc.
sampledate	Sample collection date as YYYY/MM/DD
samplelink	Code used to link relational tables (arbitrary value for database design only; irrelevant to field data)
sitetype	Description of sample location water body type (surface water, groundwater, seep)
Units	Measurement units

Columbia Analytical Services (CAS) in Kelso, Washington, USA, analyzed the TNC water and sediment samples. Full laboratory information was available for these samples, and the laboratory quality assurance/quality control results are provided in the table "tblLabInfo" in the Pebble Water Quality Access database. The analytical and extraction methods, reporting limits, and detection limits are also included in "tblLabInfo."

TNC field and equipment blanks are included in the Access table "tblTNCFieldBlanks." Samples labeled EB-XX are equipment blank samples, and samples labeled TB-XX are trip blank samples. This table also contains the results from analyses of deionized water and Aquafina water, which were not considered field blanks.

The data in the database were checked for quality using the following general approaches:

- PLP data
  - We checked the TNC-provided Excel files (OCRs of PLP data) against the original PLP PDF tables.
  - The OCR software used for the groundwater and surface water PLP data did not recognize the green or bold values (estimated and below detection values, respectively), and the qualifiers therefore required manual entry in the Excel files. During initial spot checking we found that numerous qualifiers were misidentified in the Excel file tables – at a rate of two to three per sampling station. As a result, 100% of the groundwater and surface water datasets were checked. Fortunately, PLP PDF tables provided summary statistics that could be used to identify qualifier mistakes. The summary statistics that we used were the percent of below-detection values and the number of estimated values over the given date range for each sampling location and analyte. We generated the same summary statistics using the Stratus Consulting-created Access database (once all of the import issues were resolved).
  - We compared the Access-generated summary statistics to those in the PLP PDF tables. When an inconsistency was found, values for that station/analyte were reviewed. Inconsistencies were recorded in a table that listed the original result and the corrected result. Approximately 350 qualifier inconsistencies were corrected after checking all the PLP groundwater and surface water datasets. We checked to confirm that corrections to the TNC-provided Excel workbooks were carried through to the Microsoft Access database.
  - Not a single qualifier inconsistency was found after a 25% check of the seep laboratory results dataset, which was imported to Excel using an updated OCR software version that recognized the green and bold PLP entries.
  - Seep field water quality parameter measurements that were imported to Excel were checked for consistency against values in the original PLP PDF tables.

- TNC data
  - The TNC data were laboratory analytical results and field measurements; both were provided in Excel tables. The laboratory analytical results were provided directly from the laboratory, CAS.
  - Both datasets were checked for inclusion in the Access database.
  - All samples in the TNC June 2010 dataset that were labeled as non-detects had no detection limits but did have reporting limits. In this case, reporting limits were used to calculate entries for one-half the detection limit in the database.
  - We independently calculated hardness values using calcium and magnesium concentrations and compared to CAS-calculated values. A 10% check on the two hardness calculations found no errors.
- Coordinates
  - All coordinates were converted to State Plane 83 values.
  - A subset of sampling location coordinates was checked against original hard-copy entries.

Reference

PLP. 2011. Pre-Permitting Environmental/Socio-Economic Data Report Series. Report F – Surface Water Quality. Pebble Limited Partnership. (Note: includes surface water, groundwater, and seep water quality data). Available: http://www.pebblepartnership.com/documents/report-f-surface-water-quality. Accessed May 2011.